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**United States Patent** [19]

Keefer et al.

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**David George Doman**, Delta, both of  
Canada[73] Assignee: **SoFlnoy Societte Financiere  
d'Innovation Inc.**[21] Appl. No.: **08/637,176**[22] Filed: **Apr. 24, 1996**[51] Int. Cl.<sup>7</sup> ..... **B01D 53/047**[52] U.S. Cl. .... **95/100; 95/103; 95/105;  
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96/144**[58] Field of Search ..... **95/96-106, 130,  
95/116; 96/115, 124, 130, 133, 144**[56] **References Cited****U.S. PATENT DOCUMENTS**

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Primary Examiner—Robert Spitzer

[57] **ABSTRACT**

Pressure swing adsorption (PSA) separation of a gas mixture is performed in an apparatus with a plurality of adsorbent beds. The invention provides rotary multiport distributor valves to control the timing sequence of the PSA cycle steps between the beds, with flow controls cooperating with the rotary distributor valves to control the volume rates of gas flows to and from the adsorbent beds in blowdown, purge, equalization and repressurization steps.

**46 Claims, 16 Drawing Sheets**